



1/83

SEQUENCE LISTING

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Engert, James C.  
Richter, Andrea

<120> IDENTIFICATION OF ARSACS MUTATIONS AND  
METHODS OF USE THEREFOR

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Met	Asn	Thr	Phe	Trp	Pro	Gly	Arg	Glu	Leu	Val	Val	Gln	Trp	Tyr	Pro
1				5					10					15	
Phe	Ser	Glu	Asp	Lys	Arg	His	Pro	Ser	Leu	Ser	Trp	Leu	Lys	Met	Val
		20						25					30		
Trp	Lys	Asn	Leu	Tyr	Ile	His	Phe	Ser	Glu	Asp	Leu	Thr	Leu	Phe	Asp
	35					40					45				
Glu	Met	Pro	Leu	Ile	Pro	Arg	Thr	Leu	Leu	Asn	Glu	Asp	Gln	Thr	Cys
50					55					60					
Val	Glu	Leu	Ile	Arg	Leu	Arg	Ile	Pro	Ser	Val	Val	Ile	Leu	Asp	Asp
65				70						75				80	
Glu	Thr	Glu	Ala	Gln	Leu	Pro	Glu	Phe	Leu	Ala	Asp	Ile	Val	Gln	Lys
			85					90						95	
Leu	Gly	Gly	Ile	Val	Leu	Lys	Arg	Leu	Asp	Thr	Ser	Ile	Gln	His	Pro
	100							105					110		
Leu	Val	Lys	Lys	Tyr	Ile	His	Ser	Pro	Leu	Pro	Ser	Ala	Ile	Leu	Gln
	115					120						125			
Ile	Met	Glu	Lys	Ile	Pro	Leu	Gln	Lys	Leu	Cys	Asn	Gln	Ile	Ala	Ser
130					135						140				
Leu	Leu	Pro	Thr	His	Lys	Asp	Ala	Leu	Arg	Lys	Phe	Leu	Ala	Ser	Leu
145				150						155				160	
Thr	Asp	Thr	Ser	Glu	Lys	Glu	Lys	Arg	Ile	Ile	Gln	Glu	Leu	Thr	Ile
			165					170						175	
Phe	Lys	Arg	Ile	Asn	His	Ser	Ser	Asp	Gln	Gly	Ile	Ser	Ser	Tyr	Thr
	180							185					190		
Lys	Leu	Lys	Gly	Cys	Lys	Val	Leu	Asp	His	Thr	Ala	Lys	Leu	Pro	Thr
	195					200						205			
Asp	Leu	Arg	Leu	Ser	Val	Ser	Val	Ile	Asp	Ser	Ser	Asp	Glu	Ala	Thr
210					215						220				
Ile	Arg	Leu	Ala	Asn	Met	Leu	Lys	Ile	Glu	Lys	Leu	Lys	Thr	Thr	Ser
225				230						235					240
Cys	Leu	Lys	Phe	Val	Leu	Lys	Asp	Ile	Gly	Asn	Ala	Phe	Tyr	Thr	Gln
			245					250						255	
Glu	Glu	Val	Thr	Gln	Leu	Met	Leu	Trp	Ile	Leu	Glu	Asn	Leu	Ser	Ser
	260						265						270		
Leu	Lys	Asn	Glu	Asn	Ser	Asn	Val	Leu	Asp	Trp	Leu	Met	Pro	Leu	Lys
	275					280						285			
Phe	Ile	His	Met	Ser	Gln	Gly	His	Val	Val	Ala	Ala	Gly	Asp	Leu	Phe
290					295					300					
Asp	Pro	Asp	Ile	Glu	Val	Leu	Arg	Asp	Leu	Phe	Tyr	Asn	Glu	Glu	Glu
305					310					315					320
Ala	Cys	Phe	Pro	Pro	Thr	Ile	Phe	Thr	Ser	Pro	Asp	Ile	Leu	His	Ser
			325					330						335	
Leu	Arg	Gln	Ile	Gly	Leu	Lys	Asn	Glu	Ser	Ser	Leu	Lys	Glu	Lys	Asp
		340						345					350		
Val	Val	Gln	Val	Ala	Arg	Lys	Ile	Glu	Ala	Leu	Gln	Val	Ser	Ser	Cys
	355					360						365			
Gln	Asn	Gln	Asp	Val	Leu	Met	Lys	Lys	Ala	Lys	Thr	Leu	Leu	Leu	Val
370					375						380				
Leu	Asn	Lys	Asn	Gln	Thr	Leu	Leu	Gln	Ser	Ser	Glu	Gly	Lys	Met	Ala
385				390						395					400
Leu	Lys	Lys	Ile	Lys	Trp	Val	Pro	Ala	Cys	Lys	Glu	Arg	Pro	Pro	Asn
			405					410						415	
Tyr	Pro	Gly	Ser	Leu	Val	Trp	Lys	Gly	Asp	Leu	Cys	Asn	Leu	Cys	Ala
		420						425					430		

Pro	Pro	Asp	Met	Cys	Asp	Ala	Ala	His	Ala	Val	Leu	Val	Gly	Ser	Ser
		435					440					445			
Leu	Pro	Leu	Val	Glu	Ser	Val	His	Val	Asn	Leu	Glu	Gln	Ala	Leu	Ser
	450					455					460				
Ile	Phe	Thr	Lys	Pro	Thr	Ile	Asn	Ala	Val	Leu	Lys	His	Phe	Lys	Thr
465					470					475					480
Val	Val	Asp	Trp	Tyr	Thr	Ser	Lys	Thr	Phe	Ser	Asp	Glu	Asp	Tyr	Tyr
			485						490					495	
Gln	Phe	Gln	His	Ile	Leu	Leu	Glu	Ile	Tyr	Gly	Phe	Met	His	Asp	His
			500					505					510		
Leu	Ser	Glu	Gly	Lys	Asp	Ser	Phe	Lys	Ala	Leu	Lys	Phe	Pro	Trp	Val
		515					520					525			
Trp	Thr	Gly	Lys	Asn	Phe	Cys	Pro	Leu	Ala	Gln	Ala	Val	Ile	Lys	Pro
	530					535					540				
Thr	His	Asp	Leu	Asp	Leu	Gln	Pro	Tyr	Leu	Tyr	Asn	Val	Pro	Lys	Thr
545					550					555					560
Met	Ala	Lys	Phe	His	Gln	Leu	Phe	Lys	Ala	Cys	Gly	Ser	Ile	Glu	Glu
				565					570					575	
Leu	Thr	Ser	Asp	His	Ile	Ser	Met	Val	Ile	Gln	Lys	Val	Tyr	Leu	Lys
			580					585					590		
Ser	Asp	Gln	Glu	Leu	Ser	Glu	Glu	Glu	Ser	Lys	Gln	Asn	Leu	His	Leu
		595					600					605			
Met	Leu	Asn	Ile	Met	Arg	Trp	Leu	Tyr	Ser	Asn	Gln	Ile	Pro	Ala	Ser
	610					615					620				
Pro	Asn	Thr	Pro	Val	Pro	Ile	Tyr	His	Ser	Arg	Asn	Pro	Ser	Lys	Leu
625					630					635					640
Val	Met	Lys	Pro	Ile	His	Glu	Cys	Cys	Tyr	Cys	Asp	Ile	Lys	Val	Asp
				645						650				655	
Asp	Leu	Asn	Asp	Leu	Leu	Glu	Asp	Ser	Val	Glu	Pro	Ile	Ile	Leu	Val
			660					665					670		
His	Glu	Asp	Ile	Pro	Met	Lys	Thr	Ala	Glu	Trp	Leu	Lys	Val	Pro	Cys
		675					680						685		
Leu	Ser	Thr	Arg	Leu	Ile	Asn	Pro	Glu	Asn	Met	Gly	Phe	Glu	Gln	Ser
	690					695					700				
Gly	Gln	Arg	Glu	Pro	Leu	Thr	Val	Arg	Ile	Lys	Asn	Ile	Leu	Glu	Glu
705					710					715					720
Tyr	Pro	Ser	Val	Ser	Asp	Ile	Phe	Lys	Glu	Leu	Leu	Gln	Asn	Ala	Asp
				725					730					735	
Asp	Ala	Asn	Ala	Thr	Glu	Cys	Ser	Phe	Met	Ile	Asp	Met	Arg	Arg	Asn
			740					745					750		
Met	Asp	Ile	Arg	Glu	Asn	Leu	Leu	Asp	Pro	Gly	Met	Ala	Ala	Cys	His
		755				760						765			
Gly	Pro	Ala	Leu	Trp	Ser	Phe	Asn	Asn	Ser	Glu	Phe	Ser	Asp	Ser	Asp
	770					775					780				
Phe	Leu	Asn	Ile	Thr	Arg	Leu	Gly	Glu	Ser	Leu	Lys	Arg	Gly	Glu	Val
785					790					795					800
Asp	Lys	Val	Gly	Lys	Phe	Gly	Leu	Gly	Phe	Asn	Ser	Val	Tyr	His	Ile
				805					810					815	
Thr	Asp	Ile	Pro	Ile	Ile	Met	Ser	Arg	Glu	Phe	Met	Ile	Met	Phe	Asp
			820					825					830		
Pro	Asn	Ile	Asn	His	Ile	Ser	Lys	His	Ile	Lys	Asp	Arg	Ser	Asn	Pro
		835					840					845			
Gly	Ile	Lys	Ile	Asn	Trp	Ser	Lys	Gln	Gln	Lys	Arg	Leu	Arg	Lys	Phe
	850					855					860				
Pro	Asn	Gln	Phe	Lys	Pro	Phe	Ile	Asp	Val	Phe	Gly	Cys	Gln	Leu	Pro
865					870					875					880
Leu	Ala	Val	Glu	Ala	Pro	Tyr	Ser	Tyr	Asn	Gly	Thr	Leu	Phe	Arg	Leu
				885					890					895	

Ser Phe Arg Thr Gln Gln Glu Ala Lys Val Ser Glu Val Ser Ser Thr  
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 Cys Tyr Asn Thr Ala Asp Ile Tyr Ser Leu Val Asp Glu Phe Ser Leu  
 915 920 925  
 Cys Gly His Arg Leu Ile Ile Phe Thr Gln Ser Val Asn Ser Met Tyr  
 930 935 940  
 Leu Lys Tyr Leu Lys Ile Glu Glu Thr Asn Pro Ser Leu Ala Gln Asp  
 945 950 955 960  
 Thr Ile Ile Ile Lys Lys Lys Val Cys Pro Ser Lys Ala Leu Asn Ala  
 965 970 975  
 Pro Val Leu Ser Val Leu Lys Glu Ala Lys Leu Met Lys Thr Cys  
 980 985 990  
 Ser Ser Ser Asn Lys Lys Leu Pro Thr Asp Val Pro Lys Ser Ser Cys  
 995 1000 1005  
 Ile Leu Gln Ile Thr Val Glu Glu Phe His His Val Phe Arg Arg Ile  
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 Ala Asp Leu Gln Ser Pro Leu Phe Arg Gly Pro Asp Asp Asp Pro Ala  
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 Thr Leu Phe Glu Met Ala Lys Ser Gly Gln Ser Lys Lys Pro Ser Asp  
 1045 1050 1055  
 Glu Leu Pro Gln Lys Thr Val Asp Cys Thr Thr Trp Leu Ile Cys Thr  
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 Cys Met Asp Thr Gly Glu Ala Leu Lys Phe Ser Leu Asn Glu Ser Gly  
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 Arg Arg Leu Gly Leu Val Pro Cys Gly Ala Val Gly Val Leu Leu His  
 1090 1095 1100  
 Glu Thr Gln Glu Gln Lys Trp Thr Val Lys Pro His Ile Gly Glu Val  
 1105 1110 1115 1120  
 Phe Cys Tyr Leu Pro Leu Arg Ile Lys Thr Gly Leu Pro Ile His Ile  
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 Asn Gly Cys Phe Ala Val Thr Ser Asn Arg Lys Glu Ile Trp Lys Thr  
 1140 1145 1150  
 Asp Thr Lys Gly Arg Trp Asn Thr Thr Phe Met Arg His Val Ile Val  
 1155 1160 1165  
 Lys Ala Tyr Leu Gln Ala Leu Ser Val Leu Arg Asp Leu Ala Ile Gly  
 1170 1175 1180  
 Gly Glu Leu Thr Asp Tyr Thr Tyr Tyr Ala Val Trp Pro Asp Pro Asp  
 1185 1190 1195 1200  
 Leu Val His Asp Asp Phe Ser Val Ile Cys Lys Gly Phe Tyr Glu Asp  
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 Ile Ala His Gly Lys Gly Lys Glu Leu Thr Arg Val Phe Ser Asp Gly  
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 Ser Met Trp Val Ser Met Lys Asn Val Arg Phe Leu Asp Asp Ser Ile  
 1235 1240 1245  
 Leu Gln Arg Lys Asp Val Gly Ser Ala Ala Phe Lys Ile Phe Leu Lys  
 1250 1255 1260  
 Tyr Leu Lys Lys Thr Gly Ser Lys Asn Leu Cys Ala Val Glu Leu Pro  
 1265 1270 1275 1280  
 Ser Ser Val Lys Ala Gly Phe Glu Glu Ala Gly Cys Lys Gln Ile Leu  
 1285 1290 1295  
 Leu Glu Asn Thr Phe Ser Glu Lys Gln Phe Phe Ser Glu Val Phe Phe  
 1300 1305 1310  
 Pro Asn Ile Gln Glu Ile Glu Ala Glu Leu Arg Asp Pro Leu Met Asn  
 1315 1320 1325  
 Phe Val Leu Asn Glu Lys Leu Asp Glu Phe Ser Gly Ile Leu Arg Val  
 1330 1335 1340  
 Thr Pro Cys Val Pro Cys Ser Leu Glu Gly His Pro Leu Val Leu Pro  
 1345 1350 1355 1360

Ser Arg Leu Ile His Pro Glu Gly Arg Val Ala Lys Leu Phe Asp Thr  
 1365 1370 1375  
 Lys Asp Gly Arg Phe Pro Tyr Gly Ser Thr Gln Asp Tyr Leu Asn Pro  
 1380 1385 1390  
 Ile Ile Leu Ile Lys Leu Val Gln Leu Gly Met Ala Lys Asp Asp Ile  
 1395 1400 1405  
 Leu Trp Asp Asp Met Leu Glu Arg Ala Glu Ser Val Ala Glu Ile Asn  
 1410 1415 1420  
 Lys Ser Asp His Ala Ala Cys Leu Arg Ser Ser Ile Leu Leu Ser  
 1425 1430 1435 1440  
 Leu Ile Asp Glu Lys Leu Lys Ile Lys Asp Pro Arg Ala Lys Asp Phe  
 1445 1450 1455  
 Ala Ala Lys Tyr Gln Thr Ile Pro Phe Leu Pro Phe Leu Thr Lys Pro  
 1460 1465 1470  
 Ala Gly Phe Ser Leu Glu Trp Lys Gly Asn Ser Phe Lys Pro Glu Thr  
 1475 1480 1485  
 Met Phe Ala Ala Thr Asp Ile Tyr Thr Ala Glu Tyr Gln Asp Ile Val  
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 Cys Leu Leu Gln Pro Ile Leu Asn Glu Asn Ser His Ser Phe Arg Gly  
 1505 1510 1515 1520  
 Cys Gly Ser Val Ser Leu Ala Val Lys Glu Phe Leu Gly Leu Leu Lys  
 1525 1530 1535  
 Lys Pro Thr Val Asp Leu Val Ile Asn Gln Leu Lys Gln Val Ala Lys  
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 Ser Val Asp Asp Gly Ile Thr Leu Tyr Gln Glu Asn Ile Thr Asn Ala  
 1555 1560 1565  
 Cys Tyr Lys Tyr Leu His Glu Ala Val Leu Gln Asn Glu Met Ala Lys  
 1570 1575 1580  
 Ala Thr Ile Ile Glu Lys Leu Lys Pro Phe Cys Phe Ile Leu Val Glu  
 1585 1590 1595 1600  
 Asn Val Tyr Val Glu Ser Glu Lys Val Ser Phe His Leu Asn Phe Glu  
 1605 1610 1615  
 Ala Ala Pro Tyr Leu Tyr Gln Leu Pro Asn Lys Tyr Lys Asn Asn Phe  
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 Arg Glu Leu Phe Glu Ser Val Gly Val Arg Gln Ser Phe Thr Val Glu  
 1635 1640 1645  
 Asp Phe Ala Leu Val Leu Glu Ser Ile Asp Gln Glu Arg Gly Lys Lys  
 1650 1655 1660  
 Gln Ile Thr Glu Glu Asn Phe Gln Leu Cys Arg Arg Ile Ile Ser Glu  
 1665 1670 1675 1680  
 Gly Ile Trp Ser Leu Ile Arg Glu Lys Arg Gln Glu Phe Cys Glu Lys  
 1685 1690 1695  
 Asn Tyr Gly Lys Ile Leu Leu Pro Asp Thr Asn Leu Leu Leu Pro  
 1700 1705 1710  
 Ala Lys Ser Leu Cys Tyr Asn Asp Cys Pro Trp Ile Lys Val Lys Asp  
 1715 1720 1725  
 Ser Thr Val Lys Tyr Cys His Ala Asp Ile Pro Arg Glu Val Ala Val  
 1730 1735 1740  
 Lys Leu Gly Ala Ile Pro Lys Arg His Lys Ala Leu Glu Arg Tyr Ala  
 1745 1750 1755 1760  
 Ser Asn Ile Cys Phe Thr Ala Leu Gly Thr Glu Phe Gly Gln Lys Glu  
 1765 1770 1775  
 Lys Leu Thr Ser Arg Ile Lys Ser Ile Leu Asn Ala Tyr Pro Ser Glu  
 1780 1785 1790  
 Lys Glu Met Leu Lys Glu Leu Leu Gln Asn Ala Asp Asp Ala Lys Ala  
 1795 1800 1805  
 Thr Glu Ile Cys Phe Val Phe Asp Pro Arg Gln His Pro Val Asp Arg  
 1810 1815 1820

Ile	Phe	Asp	Asp	Lys	Trp	Ala	Pro	Leu	Gln	Gly	Pro	Ala	Leu	Cys	Val	1825	1830	1835	1840
Tyr	Asn	Asn	Gln	Pro	Phe	Thr	Glu	Asp	Asp	Val	Arg	Gly	Ile	Gln	Asn	1845	1850	1855	
Leu	Gly	Lys	Gly	Thr	Lys	Glu	Gly	Asn	Pro	Cys	Lys	Thr	Gly	His	Tyr	1860	1865	1870	
Gly	Ile	Gly	Phe	Asn	Ser	Val	Tyr	His	Ile	Thr	Asp	Cys	Pro	Ser	Phe	1875	1880	1885	
Ile	Ser	Gly	Asn	Asp	Ile	Leu	Gly	Ile	Phe	Asp	Pro	His	Ala	Arg	Tyr	1890	1895	1900	
Ala	Pro	Gly	Ala	Thr	Ser	Val	Ser	Pro	Gly	Arg	Met	Phe	Arg	Asp	Leu	1905	1910	1915	1920
Asp	Ala	Asp	Phe	Arg	Thr	Gln	Phe	Ser	Asp	Val	Leu	Asp	Leu	Tyr	Leu	1925	1930	1935	
Gly	Asn	His	Phe	Lys	Leu	Asp	Asn	Cys	Thr	Met	Phe	Arg	Phe	Pro	Leu	1940	1945	1950	
Arg	Asn	Ala	Glu	Met	Ala	Gln	Val	Ser	Glu	Ile	Ser	Ser	Val	Pro	Ser	1955	1960	1965	
Ser	Asp	Arg	Met	Val	Gln	Asn	Leu	Leu	Asp	Lys	Leu	Arg	Ser	Asp	Gly	1970	1975	1980	
Ala	Glu	Leu	Leu	Met	Phe	Leu	Asn	His	Met	Glu	Lys	Ile	Ser	Ile	Cys	1985	1990	1995	2000
Glu	Ile	Asp	Lys	Ala	Thr	Gly	Gly	Leu	Asn	Val	Leu	Tyr	Ser	Val	Lys	2005	2010	2015	
Gly	Lys	Ile	Thr	Asp	Gly	Asp	Arg	Leu	Lys	Arg	Lys	Gln	Phe	His	Ala	2020	2025	2030	
Ser	Val	Ile	Asp	Ser	Val	Thr	Lys	Arg	Gln	Leu	Lys	Asp	Ile	Pro		2035	2040	2045	
Val	Gln	Gln	Ile	Thr	Tyr	Thr	Met	Asp	Thr	Glu	Asp	Ser	Glu	Gly	Asn	2050	2055	2060	
Leu	Thr	Thr	Trp	Leu	Ile	Cys	Asn	Arg	Ser	Gly	Phe	Ser	Ser	Met	Glu	2065	2070	2075	2080
Lys	Val	Ser	Lys	Ser	Val	Ile	Ser	Ala	His	Lys	Asn	Gln	Asp	Ile	Thr	2085	2090	2095	
Leu	Phe	Pro	Arg	Gly	Gly	Val	Ala	Ala	Cys	Ile	Thr	His	Asn	Tyr	Lys	2100	2105	2110	
Lys	Pro	His	Arg	Ala	Phe	Cys	Phe	Leu	Pro	Leu	Ser	Leu	Glu	Thr	Gly	2115	2120	2125	
Leu	Pro	Phe	His	Val	Asn	Gly	His	Phe	Ala	Leu	Asp	Ser	Ala	Arg	Arg	2130	2135	2140	
Asn	Leu	Trp	Arg	Asp	Asp	Asn	Gly	Val	Gly	Val	Arg	Ser	Asp	Trp	Asn	2145	2150	2155	2160
Asn	Ser	Leu	Met	Thr	Ala	Leu	Ile	Ala	Pro	Ala	Tyr	Val	Glu	Leu	Leu	2165	2170	2175	
Ile	Gln	Leu	Lys	Lys	Arg	Tyr	Phe	Pro	Gly	Ser	Asp	Pro	Thr	Leu	Ser	2180	2185	2190	
Val	Leu	Gln	Asn	Thr	Pro	Ile	His	Val	Val	Lys	Asp	Thr	Leu	Lys	Lys	2195	2200	2205	
Phe	Leu	Ser	Phe	Phe	Pro	Val	Asn	Arg	Leu	Asp	Leu	Gln	Pro	Asp	Leu	2210	2215	2220	
Tyr	Cys	Leu	Val	Lys	Ala	Leu	Tyr	Ser	Cys	Ile	His	Glu	Asp	Met	Lys	2225	2230	2235	2240
Arg	Leu	Leu	Pro	Val	Val	Arg	Ala	Pro	Asn	Ile	Asp	Gly	Ser	Asp	Leu	2245	2250	2255	
His	Ser	Ala	Val	Ile	Ile	Thr	Trp	Ile	Asn	Met	Ser	Thr	Ser	Asn	Lys	2260	2265	2270	
Thr	Arg	Pro	Phe	Phe	Asp	Asn	Leu	Leu	Gln	Asp	Glu	Leu	Gln	His	Leu	2275	2280	2285	

Lys Asn Ala Asp Tyr Asn Ile Thr Thr Arg Lys Thr Val Ala Glu Asn  
 2290 2295 2300  
 Val Tyr Arg Leu Lys His Leu Leu Leu Glu Ile Gly Phe Asn Leu Val  
 2305 2310 2315 2320  
 Tyr Asn Cys Asp Glu Thr Ala Asn Leu Tyr His Cys Leu Val Asp Ala  
 2325 2330 2335  
 Asp Ile Pro Val Ser Tyr Val Thr Pro Ala Asp Val Arg Ser Phe Leu  
 2340 2345 2350  
 Met Thr Phe Ser Ser Pro Asp Thr Asn Cys His Ile Gly Lys Leu Pro  
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 Cys Arg Leu Gln Gln Thr Asn Leu Lys Leu Phe His Ser Leu Lys Leu  
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 Leu Val Asp Tyr Cys Phe Lys Asp Ala Glu Glu Ser Glu Phe Glu Val  
 2385 2390 2395 2400  
 Glu Gly Leu Pro Leu Leu Ile Thr Leu Asp Ser Val Leu Gln Ile Phe  
 2405 2410 2415  
 Asp Gly Lys Arg Pro Lys Phe Leu Thr Thr Tyr His Glu Leu Ile Pro  
 2420 2425 2430  
 Ser Arg Lys Asp Leu Phe Met Asn Thr Leu Tyr Leu Lys Tyr Ser Ser  
 2435 2440 2445  
 Val Leu Leu Asn Cys Lys Val Ala Lys Val Phe Asp Ile Ser Ser Phe  
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 2485 2490 2495  
 Ala Trp His Phe Ile Ser Glu Ser Val Ser Val Thr Asp Asp Gln Glu  
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 Glu Pro Lys Pro Ala Phe Asp Val Ile Val Asp Ile Leu Lys Asp Trp  
 2515 2520 2525  
 Ala Leu Leu Pro Gly Thr Lys Phe Thr Val Ser Thr Ser Gln Leu Val  
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 Val Pro Glu Gly Asp Val Leu Ile Pro Leu Ser Leu Met His Ile Ala  
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 2565 2570 2575  
 Ala Gly Cys Ile Gln Leu Ala Leu Asn Lys Ile Cys Ser Lys Asp Ser  
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 Ala Ser Ile Leu Lys Ala Val His Tyr Met Val Gln Thr Ser Thr Phe  
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 Arg Thr Glu Lys Leu Met Glu Asn Asp Phe Glu Ala Leu Leu Met Tyr  
 2625 2630 2635 2640  
 Phe Asn Cys Asn Leu Ser His Leu Met Ser Gln Asp Asp Ile Lys Ile  
 2645 2650 2655  
 Leu Lys Ser Leu Pro Cys Tyr Lys Ser Ile Ser Gly Arg Tyr Met Ser  
 2660 2665 2670  
 Ile Ala Lys Phe Gly Thr Cys Tyr Val Leu Thr Lys Ser Ile Pro Ser  
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 Ala Glu Val Glu Lys Trp Thr Gln Ser Ser Ser Ser Ala Phe Leu Glu  
 2690 2695 2700  
 Glu Lys Val His Leu Lys Glu Leu Tyr Glu Val Leu Gly Cys Val Pro  
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 Val Asp Asp Leu Glu Val Tyr Leu Lys His Leu Leu Pro Lys Ile Glu  
 2725 2730 2735  
 Asn Leu Ser Tyr Asp Ala Lys Leu Glu His Leu Ile Tyr Leu Lys Asn  
 2740 2745 2750

Arg Leu Ala Ser Ile Glu Glu Pro Ser Glu Ile Lys Glu Gln Leu Phe  
 2755 2760 2765  
 Glu Lys Leu Glu Ser Leu Leu Ile Ile His Asp Ala Asn Asn Arg Leu  
 2770 2775 2780  
 Lys Gln Ala Lys His Phe Tyr Asp Arg Thr Val Arg Val Phe Glu Val  
 2785 2790 2795 2800  
 Met Leu Pro Glu Lys Leu Phe Ile Pro Lys Glu Phe Phe Lys Lys Leu  
 2805 2810 2815  
 Glu Gln Val Ile Lys Pro Lys Asn Gln Ala Ala Phe Met Thr Ser Trp  
 2820 2825 2830  
 Val Glu Phe Leu Arg Asn Ile Gly Leu Lys Tyr Ala Leu Ser Gln Gln  
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 Gln Leu Leu Gln Phe Ala Lys Glu Ile Ser Val Arg Ala Asn Thr Glu  
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 Asn Trp Ser Lys Glu Thr Leu Gln Ser Thr Val Asp Ile Leu Leu His  
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 His Ile Phe Gln Glu Arg Met Asp Leu Leu Ser Gly Asn Phe Leu Lys  
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 Phe Lys His Leu Gly Thr Glu Asp Ile Ile Ser Thr Lys Gln Tyr Val  
 3090 3095 3100  
 Glu Val Leu Ser Arg Ile Phe Lys Ser Ser Glu Gly Lys Gln Leu Asp  
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 Pro Asn Glu Met Arg Thr Val Lys Arg Val Val Ser Gly Leu Phe Lys  
 3125 3130 3135  
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tttccccatg	aatgatcaga	actgacattt	aattcatggt	tgtctcgcca	tgcttcttta	12540
ctttaacata	tttcttttgc	agaatgtaaa	aggtaatgat	aattagttta	tataagtgtta	12600
ctggctgtaa	atgatgctaa	atatacttta	tgcaattaag	ggcttacaga	acatgttgaa	12660
acttttttta	cttttattgg	gaataaggaa	tgtttgcacc	tccacatttt	attgctt	12717

&lt;210&gt; 10

&lt;211&gt; 3559

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 10

Phe	His	Gly	Leu	Arg	Trp	Phe	Gly	Lys	Ile	Phe	Ile	Tyr	Ile	Phe	Gln	1	5	10	15
Arg	Ile	Leu	Tyr	Leu	Met	Arg	Cys	His	Leu	Ser	Pro	Glu	Leu	Tyr	Arg	20	25	30	
Lys	Val	Arg	His	Val	Trp	Asn	Ser	Leu	Asp	Ser	Gly	Phe	His	Arg	Ser	35	40	45	
Phe	Thr	Met	Asn	Leu	Lys	His	Ser	Phe	Gln	Asn	Phe	Gln	Thr	Leu	Tyr	50	55	60	
Lys	Asn	Leu	Glu	Gly	Leu	Ser	Leu	Lys	Asn	Met	His	Leu	Tyr	Asn	Ile	65	70	75	80
Arg	Leu	Leu	Lys	Asn	Ile	Phe	Ile	His	His	Tyr	Gln	Val	Leu	Phe	Cys	85	90	95	
Arg	Trp	Arg	Arg	Cys	His	Cys	Arg	Asn	Cys	Val	Ile	Lys	Leu	Arg	Tyr	100	105	110	
Phe	Gln	His	Thr	Lys	Met	Pro	Gly	Ser	Ser	Trp	Leu	Val	Pro	Ile	Ala	115	120	125	
Val	Arg	Lys	Arg	Lys	Glu	Leu	Phe	Lys	Asn	Trp	Gln	Tyr	Ser	Ser	Ala	130	135	140	
Leu	Thr	Ile	Leu	Leu	Ile	Arg	Glu	Phe	Pro	Leu	Ile	Gln	Asn	Lys	Val	145	150	155	160
Val	Lys	Ser	Tyr	Thr	Ile	Leu	Pro	Asn	Ser	Gln	Gln	Ile	Cys	Asp	Phe	165	170	175	
Leu	Phe	Gln	Thr	Val	Val	Met	Lys	Leu	Leu	Phe	Val	Trp	Gln	Thr	Cys	180	185	190	
Lys	Asn	Ser	Arg	Pro	Leu	Ala	Ala	Ser	Leu	Phe	Lys	Ile	Leu	Lys	Met	195	200	205	
His	Phe	Ile	His	Met	Lys	Arg	His	Ser	Leu	Cys	Tyr	Gly	Ser	Leu	Arg	210	215	220	
Ile	Tyr	Leu	Leu	Leu	Lys	Met	Arg	Ile	Gln	Met	Cys	Leu	Ser	Gly	His	225	230	235	240
His	Asn	Ser	Ser	Arg	Tyr	His	Arg	Asn	Arg	Trp	Tyr	Gln	Leu	Val	Asn	245	250	255	
Ser	Leu	Thr	Leu	Ile	Lys	Tyr	Arg	Ile	Ser	Phe	Val	Met	Lys	Lys	Glu	260	265	270	
Pro	Ile	Ser	His	Pro	Gln	Phe	Leu	Pro	His	Gln	Ile	Phe	Phe	Thr	Pro	275	280	285	
Asp	Arg	Leu	Val	Lys	Thr	Lys	Pro	Val	Ser	Lys	Lys	Arg	Met	Leu	Cys	290	295	300	
Lys	Trp	Gln	Lys	Lys	Leu	Lys	Pro	Tyr	Arg	Ser	Val	Leu	Val	Leu	Ile	305	310	315	320
Lys	Met	Phe	Phe	Arg	Lys	Pro	Lys	Pro	Ser	Tyr	Trp	Phe	Ile	Arg	Ile	325	330	335	
Thr	His	Cys	Cys	Asn	His	Leu	Lys	Glu	Arg	His	Arg	Lys	Asn	Gly	Phe	340	345	350	
Gln	Pro	Ala	Arg	Lys	Gly	Leu	Gln	Ile	Ile	Gln	Ala	Leu	Trp	Ser	Gly	355	360	365	
Lys	Glu	Ile	Ser	Val	Ile	Ser	Val	His	His	Gln	Ile	Cys	Val	Met	Ala	370	375	380	
Met	Gln	Phe	Ser	Leu	Ala	Pro	His	Phe	Leu	Leu	Leu	Lys	Val	Ser	Met	385	390	395	400
Thr	Trp	Lys	Lys	His	Gly	Ser	Ser	Gln	Asn	Leu	Ala	Leu	Val	Leu	Ser	405	410	415	
Asn	Thr	Leu	Lys	Leu	Leu	Leu	Ile	Gly	Ile	Leu	Gln	Lys	Pro	Leu	Val	420	425	430	
Met	Lys	Thr	Thr	Ile	Asn	Ser	Ser	Ile	Phe	Cys	Leu	Arg	Phe	Thr	Asp	435	440	445	
Ser	Cys	Met	Ile	Ile	Met	Lys	Gly	Lys	Ile	Leu	Leu	Glu	Pro	Asn	Phe	450	455	460	

His	Gly	Phe	Gly	Leu	Ala	Lys	Ser	Phe	Val	His	Leu	Pro	Arg	Leu	Leu
465					470					475					480
Asn	Gln	Ser	Met	Ile	Leu	Thr	Phe	Ser	Leu	Ile	Cys	Ile	Met	Tyr	Leu
			485						490					495	
Lys	Pro	Trp	Gln	Asn	Ser	Thr	Asn	Tyr	Leu	Arg	Ser	Val	Val	Gln	Arg
			500					505					510		
Ser	His	Gln	Ile	Ile	Phe	Pro	Trp	Leu	Phe	Arg	Arg	Tyr	Ile	Ser	Lys
		515					520					525			
Val	Thr	Lys	Ile	Ser	Val	Asn	Lys	Lys	Ala	Asn	Lys	Ile	Phe	Ile	Leu
	530					535					540				
Cys	Ile	Leu	Ser	Asp	Gly	Cys	Ile	Ala	Ile	Arg	Phe	Gln	Gln	Ala	Pro
545					550					555					560
Thr	His	Gln	Phe	Leu	Tyr	Ile	Ile	Ala	Lys	Ile	Leu	Leu	Asn	Leu	Ser
				565					570					575	
Ser	Gln	Phe	Thr	Asn	Ala	Val	Ile	Val	Thr	Leu	Lys	Leu	Met	Thr	Leu
			580					585					590		
Met	Thr	Tyr	Leu	Lys	Ile	Leu	Trp	Asn	Gln	Ser	Phe	Trp	Cys	Met	Arg
		595					600					605			
Thr	Tyr	Pro	Lys	Leu	Gln	Asn	Gly	Lys	Phe	His	Ala	Leu	Val	Gln	Asp
	610					615					620				
Ile	Leu	Lys	Thr	Trp	Asp	Leu	Ser	Ser	Gln	Asp	Lys	Glu	Ser	His	Leu
625					630					635					640
Leu	Glu	Leu	Lys	Ile	Phe	Trp	Lys	Asn	Thr	Leu	Gln	Cys	Gln	Ile	Phe
				645					650					655	
Leu	Lys	Asn	Tyr	Phe	Lys	Thr	Leu	Met	Met	Gln	Met	Gln	Gln	Asn	Ala
			660					665					670		
Val	Ser	Leu	Ile	Glu	Glu	Ile	Trp	Thr	Glu	Arg	Ile	Ser	Thr	Gln	Gly
		675					680					685			
Trp	Gln	Leu	Val	Met	Asp	Leu	Leu	Cys	Gly	His	Ser	Thr	Ile	Leu	Asn
	690					695					700				
Ser	Gln	Ile	Gln	Ile	Leu	Thr	Leu	Gly	Glu	Asn	Leu	Lys	Gly	Glu	Lys
705					710					715					720
Leu	Thr	Lys	Leu	Glu	Asn	Leu	Val	Leu	Asp	Leu	Ile	Leu	Cys	Thr	Ile
			725						730					735	
Ser	Leu	Thr	Phe	Pro	Ser	Leu	Val	Gly	Asn	Ser	Cys	Ser	Ile	Gln	Thr
			740					745					750		
Ile	Ile	Ser	Val	Asn	Thr	Leu	Lys	Thr	Asn	Pro	Ile	Leu	Gly	Ser	Lys
		755					760					765			
Leu	Ile	Gly	Val	Asn	Asn	Arg	Lys	Asp	Leu	Glu	Asn	Phe	Leu	Ile	Ser
	770					775					780				
Ser	Asn	His	Leu	Met	Tyr	Leu	Ala	Val	Ser	Tyr	Leu	Leu	Lys	His	Leu
785					790					795					800
Thr	Ala	Ile	Met	Glu	Pro	Phe	Ser	Asp	Cys	Pro	Leu	Glu	Leu	Asn	Arg
				805					810					815	
Lys	Gln	Lys	Val	Lys	Leu	Val	Val	Arg	Ala	Thr	Ile	Gln	Gln	Ile	Phe
			820					825					830		
Ile	Leu	Leu	Trp	Met	Asn	Leu	Val	Ser	Val	Asp	Thr	Gly	Leu	Ser	Phe
		835					840					845			
Ser	Leu	Arg	Val	Ser	Gln	Cys	Ile	Ser	Thr	Lys	Leu	Arg	Lys	Pro	Thr
	850					855					860				
Pro	Val	His	Lys	Ile	Gln	Leu	Lys	Lys	Asn	Pro	Ala	Leu	Pro	Lys	His
865					870					875					880
Thr	His	Leu	Ser	Val	Phe	Lys	Arg	Leu	Leu	Ser	Ser	Arg	Leu	Ala	Ala
				885					890					895	
Ala	Val	Ile	Lys	Ser	Phe	Pro	Val	Met	Asn	Gln	Ser	His	Leu	Ala	Phe
			900					905					910		
Phe	Arg	Ser	Gln	Trp	Lys	Asn	Phe	Thr	Met	Cys	Ser	Glu	Gly	Leu	Leu
		915					920						925		

Ile	Tyr	Ser	Arg	His	Phe	Leu	Glu	Val	Gln	Met	Met	Thr	Gln	Leu	Leu	930	935	940
Ser	Leu	Lys	Trp	Leu	Ser	Leu	Ala	Asn	Gln	Lys	Ser	His	Gln	Met	Ser	945	950	955
Cys	His	Arg	Lys	Gln	Ser	Val	Pro	Arg	Gly	Phe	Cys	Val	Leu	Ala	Trp	965	970	975
Thr	Gln	Glu	Arg	Leu	Ser	Phe	Pro	Val	Arg	Val	Glu	Glu	Asp	Asp	Trp	980	985	990
Phe	His	Val	Gly	Gln	Glu	Phe	Ser	Cys	Gln	Lys	Ser	Arg	Thr	Arg	Ser	995	1000	1005
Gly	Gln	Asn	His	Thr	Leu	Glu	Arg	Cys	Phe	Ala	Ile	Tyr	Leu	Tyr	Glu	1010	1015	1020
Lys	Gln	Ala	Cys	Gln	Phe	Ile	Ser	Met	Gly	Ala	Leu	Leu	Leu	His	Gln	1025	1030	1035
Ile	Gly	Lys	Lys	Ser	Gly	Lys	Gln	Ile	Gln	Lys	Asp	Asp	Gly	Ile	Pro	1045	1050	1055
Arg	Ser	Asp	Met	Leu	Leu	Lys	Leu	Thr	Tyr	Arg	Tyr	Val	Ser	Tyr	Gly	1060	1065	1070
Thr	Trp	Pro	Leu	Val	Gly	Ser	Trp	Ile	Ile	Leu	Thr	Met	Gln	Tyr	Gly	1075	1080	1085
Pro	Ile	Leu	Ile	Phe	Met	Met	Ile	Phe	Leu	Phe	Ala	Lys	Asp	Phe	Met	1090	1095	1100
Lys	Ile	Leu	Met	Glu	Lys	Gly	Lys	Asn	Pro	Lys	Ser	Ser	Leu	Met	Asp	1105	1110	1115
Leu	Leu	Gly	Phe	Pro	Arg	Thr	Asp	Phe	Met	Thr	Leu	Tyr	Leu	Lys	Glu	1125	1130	1135
Glu	Met	Leu	Val	Gln	Gln	Pro	Ser	Arg	Tyr	Phe	Asn	Thr	Ser	Arg	Arg	1140	1145	1150
Leu	Gly	Pro	Lys	Thr	Phe	Val	Leu	Leu	Asn	Phe	Leu	Leu	Arg	Asn	Asp	1155	1160	1165
Leu	Lys	Lys	Leu	Ala	Ala	Asn	Arg	Tyr	Tyr	Leu	Lys	Thr	His	Phe	Gln	1170	1175	1180
Arg	Asn	Ser	Phe	Phe	Leu	Lys	Cys	Phe	Phe	Gln	Ile	Phe	Lys	Lys	Leu	1185	1190	1195
Lys	Gln	Asn	Leu	Glu	Ile	Leu	Ser	Leu	Phe	Met	Lys	Lys	Leu	Met	Ser	1205	1210	1215
Ser	Arg	Glu	Phe	Phe	Val	Leu	Leu	His	Val	Phe	Leu	Val	Pro	Trp	Arg	1220	1225	1230
Gly	Ile	Leu	Trp	Phe	Cys	His	Gln	Asp	Ser	Thr	Pro	Lys	Asp	Glu	Leu	1235	1240	1245
Gln	Ser	Tyr	Leu	Ile	Leu	Lys	Met	Gly	Asp	Ser	Leu	Met	Val	Leu	Leu	1250	1255	1260
Arg	Ile	Ile	Ser	Ile	Leu	Phe	Leu	Asn	Phe	Ser	Val	Trp	Gln	Lys		1265	1270	1275
Met	Ile	Phe	Tyr	Gly	Met	Ile	Cys	Asn	Val	Gln	Cys	Gln	Leu	Lys	Leu	1285	1290	1295
Ile	Lys	Val	Ile	Met	Leu	Leu	His	Ala	Glu	Val	Val	Ser	Tyr	Val	Leu	1300	1305	1310
Ser	Met	Arg	Asn	Lys	Gly	Ile	Leu	Glu	Gln	Arg	Ile	Leu	Leu	Gln	Asn	1315	1320	1325
Ile	Lys	Gln	Ser	Ala	Ser	Phe	His	Phe	Gln	Asn	Gln	Gln	Val	Phe	Leu	1330	1335	1340
Trp	Thr	Gly	Lys	Ala	Thr	Val	Leu	Ser	Leu	Lys	Pro	Cys	Leu	Gln	Gln	1345	1350	1355
Leu	Thr	Phe	Ile	Gln	Leu	Asn	Ile	Lys	Ile	Phe	Val	Phe	Cys	Asn	Gln	1365	1370	1375
Phe	Met	Lys	Ile	Pro	Ile	Leu	Leu	Glu	Val	Val	Val	Gln	Cys	His	Trp	1380	1385	1390



Leu Leu Lys Ser Phe Trp Asp Tyr Ser Arg Ser Gln Gln Leu Ile Trp  
 1395 1400 1405  
 Leu Thr Asn Lys Lys Gln Asn Gln Leu Met Met Glu Leu His Cys Thr  
 1410 1415 1420  
 Arg Arg Ile Ser Pro Met Leu Ala Thr Asn Thr Phe Met Lys Pro Cys  
 1425 1430 1435 1440  
 Lys Met Lys Ser Leu Arg Cys Gln Leu Leu Ile Ser Asn Pro Leu Ala  
 1445 1450 1455  
 Ser Phe Leu Arg Met His Met Leu Thr Gln Lys Arg Phe Leu Phe Ile  
 1460 1465 1470  
 Ile Leu Arg Arg His His Thr Phe Ile Ser Cys Leu Ile Ser Ile Lys  
 1475 1480 1485  
 Ile Ile Ser Ala Asn Phe Leu Lys Pro Trp Val Gly Ser His Ala Leu  
 1490 1495 1500  
 Leu Lys Ile Leu Leu Leu Phe Trp Asn Leu Leu Ile Lys Lys Glu Glu  
 1505 1510 1515 1520  
 Gln Ser Lys Gln Lys Arg Ile Phe Ser Phe Ala Asp Glu Ser Val Lys  
 1525 1530 1535  
 Glu Tyr Gly Val Ser Leu Glu Lys Arg Asn Lys Asn Phe Val Arg Lys  
 1540 1545 1550  
 Ile Met Ala Arg Tyr Tyr Cys Gln Ile Leu Ile Leu Cys Phe Ser Leu  
 1555 1560 1565  
 Leu Asn Arg Tyr Ala Thr Met Ile Ala Leu Gly Lys Arg Ile Pro Leu  
 1570 1575 1580  
 Asn Ile Val Met Leu Thr Tyr Pro Gly Lys Gln Asn Glu Gln Ser Gln  
 1585 1590 1595 1600  
 Ser Asp Thr Lys Pro Lys Asp Met His Pro Met Ser Val Leu Gln His  
 1605 1610 1615  
 Leu Ala Gln Asn Leu Gly Arg Lys Lys Asn Pro Ala Glu Leu Arg Ala  
 1620 1625 1630  
 Ser Leu Met His Ile Leu Leu Lys Arg Lys Cys Lys Ser Phe Phe Lys  
 1635 1640 1645  
 Met Leu Met Met Gln Arg Arg Gln Lys Ser Val Leu Cys Leu Ile Leu  
 1650 1655 1660  
 Asp Ser Ile Gln Leu Ile Glu Tyr Leu Met Ile Ser Gly Pro His Cys  
 1665 1670 1675 1680  
 Lys Gly Gln His Phe Val Cys Thr Thr Thr Ser His Leu Gln Lys Met  
 1685 1690 1695  
 Met Leu Glu Glu Phe Arg Ile Leu Glu Lys Ala Arg Lys Arg Glu Ile  
 1700 1705 1710  
 Leu Ile Lys Leu Asp Ser Met Glu Asp Ser Ile Leu Cys Ile Ile Ser  
 1715 1720 1725  
 Gln Thr Ala His Leu Leu Phe Leu Ala Met Thr Ser Cys Val Phe Leu  
 1730 1735 1740  
 Ile Leu Met Pro Asp Met His Gln Gly Pro His Pro Leu Val Pro Asp  
 1745 1750 1755 1760  
 Ala Cys Leu Glu Ile Trp Met Gln Ile Leu Gly His Ser Ser Gln Met  
 1765 1770 1775  
 Phe Trp Ile Phe Ile Trp Glu Pro Ile Leu Asn Trp Ile Ile Ala Gln  
 1780 1785 1790  
 Cys Ser Asp Phe Leu Phe Val Met Gln Lys Trp Gln Lys Phe Arg Lys  
 1795 1800 1805  
 Phe Arg Leu Phe Gln His Gln Thr Glu Trp Ser Arg Ile Phe Trp Thr  
 1810 1815 1820  
 Asn Cys Ala Gln Met Gly Gln Asn Phe Cys Phe Leu Ile Thr Trp Lys  
 1825 1830 1835 1840  
 Lys Phe Leu Phe Val Lys Ile Arg Val Leu Glu Leu Met Cys Cys Ile  
 1845 1850 1855

Gln	Arg	Ala	Lys	Ser	Gln	Met	Glu	Thr	Asp	Lys	Gly	Asn	Asn	Phe	Met		
			1860						1865				1870				
His	Leu	Leu	Ile	Val	Leu	Leu	Lys	Arg	Gly	Ser	Ser	Lys	Thr	Tyr	Gln		
		1875					1880					1885					
Phe	Asn	Lys	Pro	Ile	Leu	Trp	Ile	Leu	Arg	Thr	Leu	Lys	Glu	Ile	Leu		
	1890					1895					1900						
Leu	Arg	Gly	Phe	Val	Ile	Asp	Gln	Ala	Phe	Gln	Val	Trp	Arg	Lys	Tyr		
1905					1910					1915					1920		
Leu	Lys	Val	Ser	Tyr	Gln	Leu	Thr	Arg	Thr	Lys	Ile	Leu	Leu	Phe	Ser		
			1925						1930					1935			
His	Val	Val	Glu	Leu	Pro	Ala	Leu	Leu	Thr	Thr	Ile	Lys	Asn	Pro	Ile		
		1940							1945				1950				
Gly	Pro	Ser	Val	Phe	Cys	Leu	Phe	Leu	Trp	Arg	Leu	Gly	Cys	His	Phe		
	1955						1960					1965					
Met	Met	Ala	Thr	Leu	His	Trp	Ile	Gln	Pro	Glu	Gly	Thr	Cys	Gly	Val		
	1970					1975					1980						
Met	Ile	Met	Glu	Leu	Val	Phe	Glu	Val	Thr	Gly	Ile	Thr	Val	Gln	His		
1985					1990					1995					2000		
Leu	Leu	His	Met	Leu	Asn	Cys	Tyr	Ser	Lys	Asn	Gly	Ile	Ser	Leu	Val		
			2005						2010					2015			
Leu	Ile	Gln	His	Tyr	Gln	Cys	Tyr	Arg	Thr	Pro	Leu	Phe	Met	Leu	Arg		
		2020						2025					2030				
Thr	Leu	Arg	Ser	Phe	Tyr	Arg	Phe	Ser	Gln	Leu	Thr	Val	Leu	Ile	Tyr		
	2035						2040					2045					
Ser	Gln	Ile	Tyr	Ile	Val	Lys	His	Phe	Thr	Ile	Ala	Phe	Thr	Lys	Thr		
	2050					2055					2060						
Asn	Val	Phe	Tyr	Leu	Leu	Cys	Gly	Leu	Gln	Ile	Leu	Met	Ala	Leu	Thr		
2065					2070					2075					2080		
Cys	Thr	Leu	Gln	Leu	Leu	Leu	Gly	Ser	Ile	Cys	Leu	Leu	Leu	Ile	Lys		
			2085						2090					2095			
Leu	Asp	His	Phe	Leu	Thr	Ile	Tyr	Tyr	Arg	Met	Asn	Tyr	Asn	Thr	Leu		
		2100						2105					2110				
Lys	Met	Gln	Ile	Ile	Ile	Ser	Pro	His	Ala	Lys	Gln	Gln	Arg	Met	Ser		
	2115						2120					2125					
Ile	Gly	Asn	Ile	Ser	Phe	Lys	Leu	Val	Ser	Thr	Trp	Phe	Ile	Thr	Val		
	2130					2135					2140						
Met	Lys	Leu	Leu	Ile	Phe	Thr	Thr	Val	Leu	Met	Gln	Ile	Phe	Leu	Leu		
2145				2150						2155					2160		
Val	Met	Pro	Leu	Leu	Ile	Ser	Asp	Leu	Phe	His	Phe	Pro	Leu	Leu	Thr		
			2165						2170					2175			
Leu	Ile	Ala	Ile	Leu	Gly	Ser	Cys	Leu	Val	Val	Cys	Ser	Arg	Leu	Ile		
		2180						2185				2190					
Asn	Phe	Phe	Ile	Val	Asn	Phe	Leu	Ile	Ile	Val	Leu	Lys	Met	Gln	Lys		
	2195						2200					2205					
Lys	Met	Arg	Leu	Lys	Leu	Arg	Asp	Cys	Pro	Phe	Ser	Ser	His	Trp	Thr		
	2210					2215					2220						
Val	Phe	Cys	Lys	Leu	Leu	Met	Gln	Asn	Asp	Pro	Ser	Phe	Gln	His	Ile		
2225					2230					2235					2240		
Met	Asn	Phe	His	Pro	Ala	Lys	Thr	Cys	Leu	Ile	His	Tyr	Ile	Asn	Ile		
			2245						2250					2255			
Val	Ile	Phe	Tyr	Thr	Val	Lys	Leu	Gln	Lys	Cys	Leu	Thr	Phe	Pro	Ala		
		2260						2265					2270				
Leu	Leu	Ile	Cys	Tyr	Pro	Leu	Cys	Cys	Leu	Glu	Asn	Ile	Arg	Pro	Lys		
	2275						2280					2285					
Val	Ala	Gln	Ser	Gly	Lys	Thr	Ile	Leu	Gln	Val	Ser	Leu	Gly	Leu	Arg		
	2290					2295					2300						
Met	His	Gly	Ile	Leu	Leu	Val	Asn	Leu	Val	Lys	Lys	Ile	Arg	Lys	Lys		
2305					2310					2315					2320		

Gln	Asn	Gln	His	Leu	Thr	Leu	Leu	Leu	Ile	Leu	Lys	Thr	Gly	His	Cys		
				2325					2330					2335			
Phe	Gln	Glu	Gln	Ser	Leu	Leu	Phe	Gln	Pro	Thr	Ser	Leu	Trp	Phe	Leu		
			2340					2345					2350				
Lys	Glu	Met	Phe	Cys	Phe	Leu	Ser	Ala	Leu	Cys	Thr	Leu	Gln	Phe	Phe		
		2355					2360					2365					
Gln	Met	Pro	Arg	Val	Ile	Lys	Phe	Phe	Met	Leu	Lys	Pro	Ala	Val	Phe		
	2370					2375					2380						
Ser	Leu	Leu	Thr	Lys	Ser	Val	Pro	Lys	Thr	Val	His	Leu	Phe	Leu	Cys		
2385				2390						2395					2400		
Cys	His	Val	Thr	Gln	Gln	Ile	Arg	Ala	Pro	Gln	Ala	Ser	Arg	Leu	Tyr		
			2405					2410					2415				
Ile	Ile	Trp	Ser	Lys	Leu	Gln	His	Leu	Glu	Gln	Lys	Asn	Lys	Met	Ile		
		2420						2425					2430				
Leu	Arg	His	Phe	Cys	Ile	Ser	Thr	Ala	Ile	Ile	Ile	Cys	Pro	Lys	Met		
	2435						2440					2445					
Ile	Lys	Phe	Ser	His	Phe	Arg	Ala	Ile	Asn	Pro	Ser	Val	Ala	Ala	Met		
	2450					2455					2460						
Ala	Leu	Glu	Asn	Leu	Glu	His	Ala	Thr	Tyr	Leu	Gln	Lys	Val	Ser	Leu		
2465				2470						2475					2480		
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Glu Ile Gln Asp Gln Lys Trp Thr Val Lys Pro His Ile Gly Glu Val	1105	1110	1115	1120
Phe Cys Tyr Leu Pro Leu Arg Ile Lys Thr Gly Leu Pro Val His Ile		1125	1130	1135
Asn Gly Cys Phe Ala Val Thr Ser Asn Arg Lys Glu Ile Trp Lys Thr		1140	1145	1150
Asp Thr Lys Gly Arg Trp Asn Thr Thr Phe Met Arg His Val Ile Val		1155	1160	1165
Lys Ala Tyr Leu Gln Val Leu Ser Val Leu Arg Asp Leu Ala Thr Ser		1170	1175	1180
Gly Glu Leu Met Asp Tyr Thr Tyr Tyr Ala Val Trp Pro Asp Pro Asp	1185	1190	1195	1200
Leu Val His Asp Asp Phe Ser Val Ile Cys Gln Gly Phe Tyr Glu Asp		1205	1210	1215
Ile Ala His Gly Lys Gly Lys Glu Leu Thr Lys Val Phe Ser Asp Gly		1220	1225	1230
Ser Thr Trp Val Ser Met Lys Asn Val Arg Phe Leu Asp Asp Ser Ile		1235	1240	1245
Leu Lys Arg Arg Asp Val Gly Ser Ala Ala Phe Lys Ile Phe Leu Lys		1250	1255	1260
Tyr Leu Lys Lys Thr Gly Ser Lys Asn Leu Cys Ala Val Glu Leu Pro	1265	1270	1275	1280
Ser Ser Val Lys Leu Gly Phe Glu Glu Ala Gly Cys Lys Gln Ile Leu		1285	1290	1295
Leu Glu Asn Thr Phe Ser Glu Lys Gln Phe Phe Ser Glu Val Phe Phe		1300	1305	1310
Pro Asn Ile Gln Glu Ile Glu Ala Glu Leu Arg Asp Pro Leu Met Ile		1315	1320	1325
Phe Val Leu Asn Glu Lys Val Asp Glu Phe Ser Gly Val Leu Arg Val		1330	1335	1340
Thr Pro Cys Ile Pro Cys Ser Leu Glu Gly His Pro Leu Val Leu Pro	1345	1350	1355	1360
Ser Arg Leu Ile His Pro Glu Gly Arg Val Ala Lys Leu Phe Asp Ile		1365	1370	1375
Lys Asp Gly Arg Phe Pro Tyr Gly Ser Thr Gln Asp Tyr Leu Asn Pro		1380	1385	1390
Ile Ile Leu Ile Lys Leu Val Gln Leu Gly Met Ala Lys Asp Asp Ile		1395	1400	1405
Leu Trp Asp Asp Met Leu Glu Arg Ala Val Ser Val Ala Glu Ile Asn		1410	1415	1420
Lys Ser Asp His Val Ala Ala Cys Leu Arg Ser Ser Ile Leu Leu Ser	1425	1430	1435	1440
Leu Ile Asp Glu Lys Leu Lys Ile Arg Asp Pro Arg Ala Lys Asp Phe		1445	1450	1455
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Ala Gly Phe Ser Leu Asp Trp Lys Gly Asn Ser Phe Lys Pro Glu Thr		1475	1480	1485
Met Phe Ala Ala Thr Asp Leu Tyr Thr Ala Glu His Gln Asp Ile Val		1490	1495	1500
Cys Leu Leu Gln Pro Ile Leu Asn Glu Asn Ser His Ser Phe Arg Gly	1505	1510	1515	1520
Cys Gly Ser Val Ser Leu Ala Val Lys Glu Phe Leu Gly Leu Leu Lys		1525	1530	1535
Lys Pro Thr Val Asp Leu Val Ile Asn Gln Leu Lys Glu Val Ala Lys		1540	1545	1550
Ser Val Asp Asp Gly Ile Thr Leu Tyr Gln Glu Asn Ile Thr Asn Ala	1555	1560	1565	

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Asp	Phe	Ala	Leu	Val	Leu	Glu	Ser	Ile	Asp	Gln	Glu	Arg	Gly	Thr	Lys	1650	1655	1660
Gln	Ile	Thr	Glu	Glu	Asn	Phe	Gln	Leu	Cys	Arg	Arg	Ile	Ile	Ser	Glu	1665	1670	1675
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Thr	Thr	Val	Lys	Tyr	Cys	His	Ala	Asp	Ile	Pro	Arg	Glu	Val	Ala	Val	1730	1735	1740
Lys	Leu	Gly	Ala	Val	Pro	Lys	Arg	His	Lys	Ala	Leu	Glu	Arg	Tyr	Ala	1745	1750	1755
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Lys	Glu	Met	Leu	Lys	Glu	Leu	Leu	Gln	Asn	Ala	Asp	Asp	Ala	Lys	Ala	1795	1800	1805
Thr	Glu	Ile	Cys	Phe	Val	Phe	Asp	Pro	Arg	Gln	His	Pro	Val	Asp	Arg	1810	1815	1820
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Tyr	Asn	Asn	Gln	Pro	Phe	Thr	Glu	Asp	Asp	Val	Arg	Gly	Ile	Gln	Asn	1845	1850	1855
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Ala	Pro	Gly	Ala	Thr	Ser	Ile	Ser	Pro	Gly	Arg	Met	Phe	Arg	Asp	Leu	1905	1910	1915
Asp	Ala	Asp	Phe	Arg	Thr	Gln	Phe	Ser	Asp	Val	Leu	Asp	Leu	Tyr	Leu	1925	1930	1935
Gly	Thr	His	Phe	Lys	Leu	Asp	Asn	Cys	Thr	Met	Phe	Arg	Phe	Pro	Leu	1940	1945	1950
Arg	Asn	Ala	Glu	Met	Ala	Lys	Val	Ser	Glu	Ile	Ser	Ser	Val	Pro	Ala	1955	1960	1965
Ser	Asp	Arg	Met	Val	Gln	Asn	Leu	Leu	Asp	Lys	Leu	Arg	Ser	Asp	Gly	1970	1975	1980
Ala	Glu	Leu	Leu	Met	Phe	Leu	Asn	His	Met	Glu	Lys	Ile	Ser	Ile	Cys	1985	1990	1995
Glu	Ile	Asp	Lys	Ser	Thr	Gly	Ala	Leu	Asn	Val	Leu	Tyr	Ser	Val	Lys	2005	2010	2015
Gly	Lys	Ile	Thr	Asp	Gly	Asp	Arg	Leu	Lys	Arg	Lys	Gln	Phe	His	Ala	2020	2025	2030

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Asp Ala Asn Ala Thr Glu Cys Ser Phe Leu Ile Asp Met Arg Arg Asn  
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Met Asp Ile Arg Glu Asn Leu Leu Asp Pro Gly Met Ala Ala Cys His  
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Gly Pro Ala Leu Trp Ser Phe Asn Asn Ser Gln Phe Ser Asp Ser Asp  
65 70 75 80  
Phe Val Asn Ile Thr Arg Leu Gly Glu Ser Leu Lys Arg Gly Glu Val  
85 90 95  
Asp Lys Val Gly Lys Phe Gly Leu Gly Phe Asn Ser Val Tyr His Ile  
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Conclude

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